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# **DEVELOPMENT OF OPTIMUM UTILIZATION OF COMMUNICATION INFRASTRUCTURE IN THE CEYLON ELECTRICITY BOARD**

**A dissertation submitted to the  
Department of Computer Science, University of Moratuwa  
In partial fulfillment of the requirements for the  
Degree of Master of Business Administration  
In  
Information Technology**

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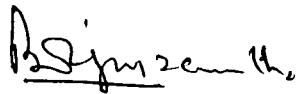
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## DECLARATION

The work submitted in this dissertation is the result of my own investigation, except where otherwise stated.

It has not already been accepted for any degree, and is also not being concurrently submitted for any other degree.



P.B. Mahinda Wijayasantha

We endorse the declaration by the candidate.

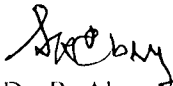


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Signed by each supervisor



Dr. Lanka Udawatta



Dr. R. Abeysekara

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## ABSTRACT

Telecommunication plays a vital role in any business activity and is also so in the case of an electric power utility. The availability and reliability of a telecommunication system is most essential in carrying out the coordination of the Generation, Transmission and Distribution of electrical energy in the country.

This thesis describes the current status of the telecommunication facilities available in the Sri Lankan power system, its usage in day-to-day operation, its limitation in monitoring of the power system and other inherent problems.

The latest technology adopted in most parts of the world for utility communications is the OPGW. The golden opportunity of readily available right of way to the last mile can be used very effectively using this telecommunication practice at competitive prices. Hence the CEB also embarked on this technology and has installed a few OPGW on some High Voltage lines. As the communication capacity is almost unlimited in this type of technology, it is essential to maximize the usage more economically and effectively to solve the communication requirements of CEB.



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This reports further analyzes the Communication requirements of CEB (Objective 2)

Furthermore, this thesis also describes various areas where one could utilize the technology to resolve System Operations, SCADA, customer related issues, billing & metering etc in a most cost effective manner. The finding has justified the ways and means of utilizing these assets to venture into non-core business activities in the field of telecommunications. (Objective 3)

A commercial licence is required for entering into a telecommunication business. Partnering with the market leader in the telecommunication industry would create a good image among the public.

Investing on fiber optic based telecommunication is the best option for today and even tomorrow. In this study Optical Ground Wire (OPGW), single mode with 1550nm window is selected. It is proposed to have four STM fiber optic rings together with some radial links for the use in the CEB. The extra capacities can be used for doing telecommunication business. Marketing E-1 links has been considered in this study and 10% of the available capacity is the threshold point of project viability. But it is seen that even with low capacity demands for bandwidth (<10%) the indirect benefits are higher than the project cost. Hence the implementation of OPGW project is in any case viable and profitable.

Developing a OPGW network would benefit the CEB in many ways while giving quality service to the public. It is expected that 50% of present telecommunication costs paid to other operators can be drastically reduced together with reduction in Total Energy requirement to the country which would save millions of rupees to the CEB and to the country using sophisticated software. The broadband over power line (BPL) technology has been selected to access the last mile to provide VoiP, video and data, together with other utility requirements in this study. Although the BPL Standard is yet to be published by the authorities, since the basic costs are identified, it is suggested that a pilot project be implemented to see if it is viable. From the available CEB database, the total potential of customers has been identified. The questionnaire results have justified the hypothesis that BPL is the low cost solution to provide Internet to the rural sector. Good marketing strategy and early adaptation of OPGW & BPL can perform better than competitors and at a competitive price. The public sector, Government ministries like Health, Education, Defense and the Agriculture sector etc. can grab the services offered through this technology for the betterment of the country.



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## DEDICATION

This thesis is dedicated to my beloved parents, wife **Manomanie**, and two daughters **Amanda & Chelsea**, who have always been with me in every hurdle I cleared.

**Mahinda Wijayasantha**

December- 2006.



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Not forgetting, I would like to express my sincere gratitude to all concerned, who have filled my questionnaire and helped me in numerous way to make this a success..

P.B.Mahinda. Wijayasantha


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## ABBREVIATION

ADSS	All Dielectric Self Support
AGM-R4	Additional General Manager –Region 4
AMR	Automated Meter Reading
BPL	Broadband Power Line
CDMA	Code division multiplexing
CEB	Ceylon Electricity Board.
DCN	Data communication system
DGEU	Department of Government Electrical Undertakings.
DGM	Deputy General Manager
DSL	Digital subscriber Loop
DWDM	Dense wavelength division multiplexing
FTTH	Fiber to the home
GIS	Global Information System
GSS	Grid Substation
GWh	Giga Watt hours
HV	High Voltage
ICCP	Inter Control Center Protocol
IEEE	Institution of Electrical & Electronics Engineering
IP	Internet Protocol
ISP	Internet Service Provider
ITU	International Telecommunication Union

KHz	Kilo Hertz
kV	Kilo Volts
KWh	Kilo Watt hours
LAN	Local Area Network
LECO	Lanka Electricity Company
LKR	Lanka Rupees
Mbps	Mega byte per seconds
MHz	Mega Hertz
MIS	Management Information System
MTTR	Mean time to repair
MV/LV	Medium Voltage/Low Voltage
MVA	Mega Volt Ampere
MW	Mega Watt
NCP	North Central Province
NWP	North Western Province
OH	Over Head
OPGW	Optical Ground Wire
PABX	Public Auto Branch Exchange
PLC	Power line Carrier
PLTS	Party line Telephone System
PLTS	Party Line Telephone System
POS	Point of Sale
PUCSL	Public Utilities Commission of Sri Lanka

RF	Radio Frequency
RTU	Remote Terminal Unit
SCADA	Supervisory Control and Data Acquisition Network
SCC	System Control Centre
SDH	Synchronous Digital Hierarchy
SEMA	Strategic Enterprises Management Agency
SLT	Sri Lanka Telecomm
SMF	Single Mode Fiber
STM	Synchronous Transport Module
TDM	Time Division Multiplexing
TELCO	Telecom Operators
TRC	 University of Moratuwa, Sri Lanka. Electronic Theses & Dissertations Telecommunication Regulatory Commission
UG	Underground
UHF	Ultra High Frequency
VHF	Very High Frequency
VoIP	Voice over Internet Protocol
VPN	Virtual Private Network
WAN	Wide Area Network
WDM	Wavelength Division Multiplexing
WPN	Western province North

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